

**Redescriptions of Ewing's Oribatid Mites, V—
Families Belbidae and Opiidae (Acarina:
Oribatei)¹**

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This paper is the fifth in a series which deals with redescrptions of Ewing's type oribatid mites. The accompanying figures were completed from pencil drawings sent to the writer by Dr. E. W. Baker of the U. S. National Museum. Acknowledgement of these drawings is made by Dr. Baker's initials on the finished plates. Ewing's original descriptions are followed as closely as possible, but the writer incorporates modern acarological terms where needed.

Both Grandjean (1936) and Strenske (1955) indicate features which can be employed to differentiate the genera of the Belbidae. The solenidions, or tactile hairs, constitute one of these morphological features; other characters also are mentioned by these authors. Many of these diagnostic features were not known to Ewing. Most of his descriptions were accompanied by an illustration or two, but in many instances the figures represented single diagnostic features such as a pseudo-stigmatic organ, lamella, leg, etc. In many cases Ewing did not illustrate the entire mite, which is the situation in some of the belbids described by him.

The descriptions in this paper are as detailed as possible with the information available from Ewing's figures and descriptions and the drawings from Dr. Baker. The figures show the whole body of the mite and the proximal segments of the legs. Solenidions and other critical details are lacking in the descriptions and figures because the writer does not have access to the type specimens. It is impossible to be absolutely certain of the generic designations of all of these mites, but the writer has placed them as accurately as possible. He has used Ewing's designations for some of them until such time as the

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type specimens can be examined critically for solenidions and other details. Despite the latter difficulties, these redescriptions should be of value because the fragmentary accounts and illustrations of these mites have been embellished in this paper.

FAMILY BELBIDAE WILLMANN, 1931

These apterogasterine mites are distinguished by legs which are longer than the body and frequently consist of bead-like segments. Legs III and IV are usually inserted in the lateral margins of the body and the dorsal surface of the hysterosoma is not reflected ventrally. In some instances the cast nymphal skins are carried on the dorsum of the hysterosoma.

Genus **HETERODAMAEUS**, n. g. (Figs. 1, 2)

Description: Sclerotized sculpturing on dorsum of propodosoma between and anterior to the pseudostigmata; a transverse suture on dorsum of propodosoma at level of insertions of rostral hairs; pseudostigmatic organs large, clavate, setose; dorsum of hysterosoma with four posterior setae in a transverse row adjacent to posterior margin of hysterosoma; surfaces of propodosoma, hysterosoma and legs with many small tubercles; a large spine projecting laterad from the rim of camerostome to the edge of tectopodia I anterior to level of coxae I.

Heterodamaeus magnisetosus (Ewing), 1909. (Figs. 1, 2)

Cotype: *Damacus magnisetosus* Ewing, 1909, p. 129.

Description: Chestnut brown; propodosoma about two-thirds as long as hysterosoma and about three-fourths as wide, somewhat triangular in shape, surface pebbled with many small tubercles. A transverse, sclerotized ridge and suture between insertions of rostral hairs. Rostrum blunt, depressed; rostral hairs inserted in lateral margins of sclerotized transverse ridge which runs between them, about as long as transverse ridge, stout and pectinate, curved medially until they nearly meet anterior to tip of rostrum. Lateral margins of propodosoma expanded in prominent tectopodia of legs I and II; tectopodia I

larger and directed anteriorly. Lamellae absent. Lamellar hairs fine, simple, inserted about half their lengths anterior to pseudostigmata and directly laterad of antestigmatic bar. Interlamellar hairs not visible, but insertions of these hairs are mediad and anterior of pseudostigmata. Three sclerotized bars or ridges on dorsum of propodosoma anterior to pseudostigmata (fig. 1). Anterior bar curved posteriorly at lateral ends, curved apex at level of tectopodia I in mid-dorsal area of propodosoma. A posterior bar behind and forming an eye-like loop (fig. 1). Two antestigmatic bars which extend between insertions of lamellar and interlamellar hairs and end at antero-lateral margins of pseudostigmata (fig. 1). Pseudostigmata large pits with sclerotized rims at posterior end of antestigmatic bar, mediad of level of tectopodia II, cup projected above surface of propodosoma. Pseudostigmatic organs about as long as leg II, clavate, the head nearly as wide as opening of pseudostigmatic cup and about one-third as long as entire organ, setose (Ewing says: "pectinate"), with a long, thin pedicel, slightly curved, but extended laterally.

Hysterosoma globose, surface pebbled like propodosoma, evidently covered with an exudate, lateral margins bent ventrally slightly; four pairs of visible setae in a transverse row near medio-posterior margin; a pair of glandular fissures (?) in mid-lateral surfaces of dorsum (fig. 1).

Ventral margins of propodosoma with a prominent lateral spine anterior to leg I, extending from lateral rim of camerostome to margin of tectopodia I. Ventral plate circular in outline, about as broad as long, broken on right side in cotype specimen. A single pair of setal insertions visible anterior to genital opening (fig. 2). Genital aperture subrectangular, at level of leg IV. Genital covers as wide as anal covers, but half as long; genital setae not visible. Anal aperture nearly twice as long as genital opening, separated from genital aperture by half the width of a genital cover. Anal covers slightly opened in cotype specimen; no visible anal setae.

All legs with pebbled, tuberculate surface. Ewing (1909) states: "First pair of legs as long as the body; second pair about

three fourths as long as the first pair; third pair equal to the first, and the last pair of legs the longest of all. Tarsus of leg I shorter than the tibia. The tibia of leg I is peculiar in this species in that it possesses a large process or tubercle at its dorsal distal aspect from which arises a large, long, tactile hair. Ungues tridactyle, situated on very long and slender tarsal pedicels; dactyles unequal."

Length, 560 μ , hysterosoma 360 μ ; width 330 μ .

Specimens of this species were collected in moss by C. A. Hart at Pulaski, Illinois and by H. E. Ewing at Arcola, Illinois.

Discussion: Ewing (1909) considers this species remarkable because of the large pseudostigmatic organs, the tibial projection on leg I, and the shorter length of the second pair of legs. The writer contends that the sclerotized ridges on the propodosoma, the large pseudostigmatic organs, the ventral spines lateral to the camerostome and the four dorsal posterior setae are valid evidences for the generic designation of this species.

Damaeus michaeli Ewing, 1909, p. 129. (Figs. 3, 4)

Description: Chestnut brown; propodosoma broadly triangular in outline, insertions of legs I and II making posterior two-thirds broader than anterior end. Rostrum with a sclerotized margin, somewhat square in outline; rostral hairs curved, stout, inserted in antero-lateral corners of sclerotized margin. Lamellae absent, lamellar hairs inserted twice the width of insertions posterior to rostral hairs; lamellar hairs stout, curved, nearly as long as width of rostrum. Interlamellar hairs inserted between pseudostigmatic organs, directed anteriorly. Pseudostigmata funnel-shaped, placed mediad of space between legs I and II in lateral margin of propodosoma, with a sclerotized rim. Pseudostigmatic organs flagelliform and barbed (Ewing says: "pectinate"), directed laterad and upward. Tectopedia III with stout spines projecting somewhat anteriorly near margin of propodosoma. Spinae adnatae stout, slightly decurved at tips, arising at level of leg III, projected anteriorly from beneath anterior edge of hysterosoma (fig. 3).

Hysterosoma globular, about twice as long as propodosoma, lateral edges curved ventrally, surface brittle, almost smooth, with eight pairs of curved, stout, pectinate bristles in two medio-lateral rows on dorsum (fig. 3).

Camerostome pyramidal, with two fine, short bristles near chelicerae. Venter of propodosoma with sclerotized margins, four pairs of bristles lateral and posterior to camerostome (fig. 4), posterior margin of propodosoma with two short, blunt spines which project posteriorly and evidently fit into small recesses in venter of hysterosoma. Genital opening subglobose in outline, about as long as anal aperture, but slightly wider; genital covers rectangular, each cover with six genital setae in a row closer to medial edge than to lateral; g: 1 close to anterior margin of cover; g: 2-g: 6 equally spaced posteriorly. Two pairs of adgenital setae as in fig. 4. Anal opening slightly narrower than genital aperture, oval in outline, covers narrower than genital covers; each cover with two pairs of anal setae; a: 1 closer to anterior margin of anal cover than a: 2 is to the posterior margin (fig. 4). Two pairs of adanal setae near postero-lateral curve of anal aperture. Two pairs of fine, simple setae on decurved surface of dorsal plate, each pair postero-laterad of adanal setae, but with more widely separated insertions.

Ewing (1909) states: "Legs stout; femora with narrow peduncle and large clavate head; each segment bears several stout, curved, pectinate bristles. Portions of cast skin generally carried on the dorsum of the abdomen."

Length 495 μ , hysterosoma 380 μ ; width 320 μ .

Many specimens of this species were collected by H. E. Ewing in moss and under bark of logs at Homer, Illinois.

Damaeus globifer Ewing, 1913, p. 120. (Figs. 5, 6)

Description: Chestnut brown. Propodosoma about two-thirds as long as hysterosoma, broadly triangular. Rostrum blunt, cone-like; rostral hairs inserted about a third their lengths posterior to rostral tip on lateral edges, incurved so that tips nearly meet. Lamellae wanting. Lamellar hairs inserted

about a third their lengths posterior and medial to rostral hairs; a sclerotized, raised lateral prominence between rostral and lamellar hairs (fig. 5). Sclerotization of insertions of legs I prominent, visible at lateral margins of propodosoma. Interlamellar hairs inserted medial to pseudostigmata, long, filiform, broken at tips in type specimen. Pseudostigmata prominent, funnel-shaped, between expanded insertions of legs I and II and on slightly raised prominence lateral to insertions of interlamellar hairs. Pseudostigmatic organ long, stout, slightly pectinate. Spinae adnatae stout, curved laterad at tips, inserted about twice their lengths posterior to pseudostigmata. (Ewing (1913) states that these spine-like spurs curve inward, but his illustration in the same article shows them curved outward in the fashion indicated in fig. 5.)

Hysterosoma spherical, smooth, with nine pairs of stout, curved, simple setae on dorso-lateral aspects, their raised insertions arranged in an elongated oval on the dorsum; tips of some bristles broken in type specimen.

Camerostome trapezoidal, a pair of setae posterior to chelicerae and medial to tectopodia I. Apodemata II narrow, decurved bars, medial portion indistinctly projected medio-posteriorly beneath integument. Three simple setae inserted in a diagonal line on each side from level of tectopodia II to level of lateral spine between legs II and III (fig. 6). A large curved, lateral spine at junction of propodosoma and hysterosoma between legs II and III; a small lateral spine projects anteriorly close to base of the large lateral spine. A long lateral spine between legs III and IV. A simple decurved bristle anterior to coxa IV; other ventral setae as shown in fig. 6. Genital opening rectangular, directly between legs IV, each corner rounded, entire aperture ringed with a sclerotized margin; each genital cover with six setae in a row down middle of cover; g:1 inserted close to anterior margin of cover; g:2, g:3, g:4 equidistant from each other; g:5 closer to g:6 than to g:4; all genital setae simple and decurved; a diagonal sclerotized bar in each genital cover and transecting insertion of g:2 (fig. 6). Anal aperture nearly twice the width of peripheral genital band

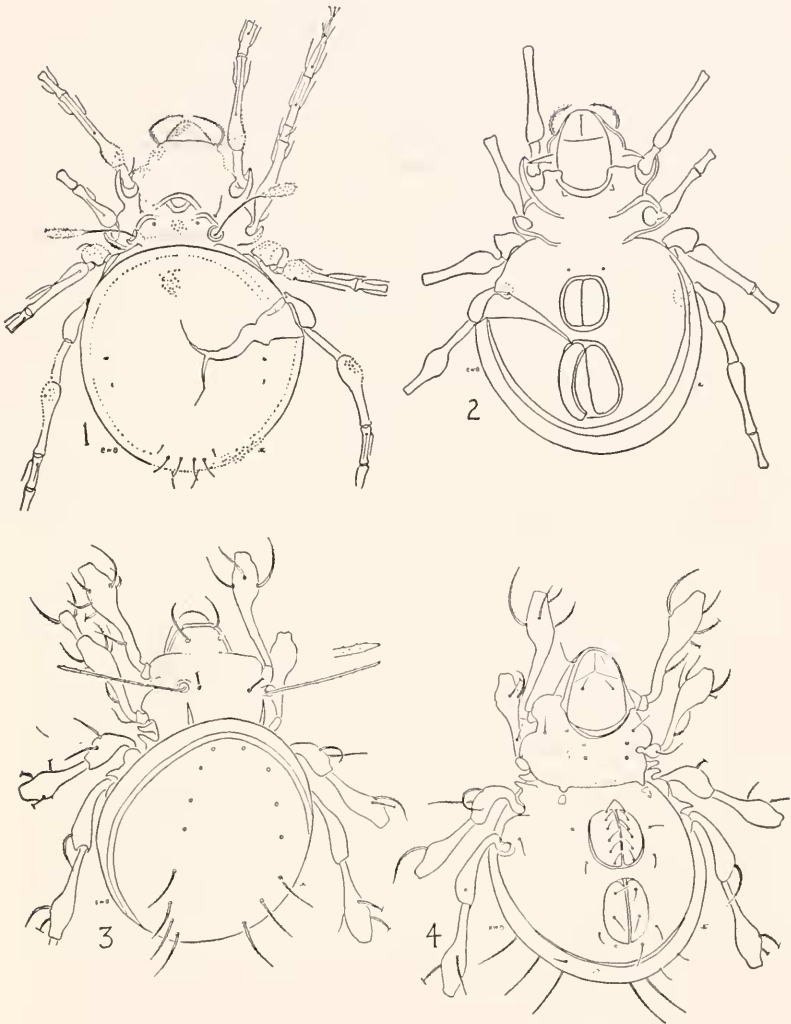


FIG. 1. Dorsal view of *Heterodamacus magnisetosus* (Ewing). Hysterosoma broken on right side.
FIG. 2. Ventral view of *Heterodamacus magnisetosus* (Ewing).
FIG. 3. Dorsal view of *Damacus michaeli* Ewing.
FIG. 4. Ventral view of *Damacus michaeli* Ewing.

from genital aperture, oval in outline; anal covers opened slightly, each with two simple bristles in medial aspects of cover. Adanal setae as seen in fig. 6.

Ewing's descriptions of the legs is as follows: "All segments of the legs with a swollen portion; second pair of legs subequal to the others. Femora of legs with a thin proximal part; distally suddenly enlarged. Anterior pair of legs about as long as the whole body. Distal end of tibia of leg I without a large tubercle bearing a tactile hair. Femur of leg IV with a very long, tactile bristle at its distal end."

Length 711 μ , hysterosoma 500 μ ; width 500 μ .

The type specimen was collected by J. E. Guthrie on decaying mushrooms at Jordan, Minnesota.

Discussion: Ewing indicates that this species is similar to *D. sufflexus* Mich., but the hairs on the dorsum of the hysterosoma are "about twice as long as those of *sufflexus*." With the current use of solendridions and minute details for differentiation of genera and species, better comparisons cannot be made without study of the type specimens of these belbid mites.

FAMILY OPIIDAE GRANDJEAN, 1953

The opiid mites constitute the smallest of the Oribatei. Their coloration is usually light yellowish brown, their legs are like those of most eremacids, but their body size seems to separate them rather easily from the latter and from other Oribatei. Ewing (1917) used *Damaeus* as the generic designation of one of his mites, which would place it in the family Belbidae. Its propodosomal configurations and its size, however, indicate that it belongs in the Family Opiidae as designated by Grandjean (1953).

Oppia minuta (Ewing), 1917. (Figs. 7, 8)

Type: *Damaeus minutus* Ewing, 1917, p. 164.

Description: Minute; light yellowish brown, shiny. Propodosoma bluntly pointed anteriorly, with nearly parallel sides, broadest immediately anterior to pseudostigmata, a raised dorsal

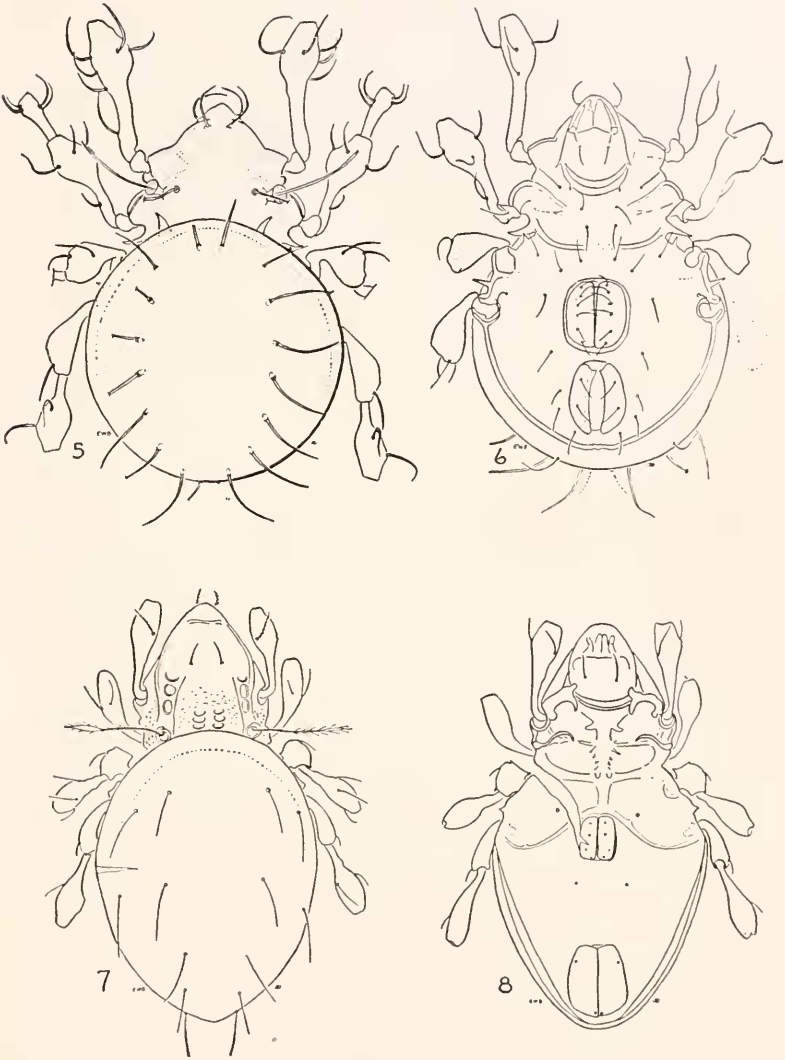


FIG. 5. Dorsal view of *Damacus globifer* Ewing.
 FIG. 6. Ventral view of *Damacus globifer* Ewing.
 FIG. 7. Dorsal view of *Oppia minuta* (Ewing).
 FIG. 8. Ventral view of *Oppia minuta* (Ewing).

platform circumscribed by a narrow lateral ridge which extends from pseudostigmata almost to anterior tip of rostrum. Rostrum blunt, rostral hairs short, pilose, strongly curved. Dorsum of propodosoma smooth except for shallow depressions; upper surfaces of tectopodia I and II with small raised tubercles (fig. 7). Lamellae thin lines mediad of pseudostigmata, anterior tips remote from lamellar hairs; lamellar hairs simple, about their lengths apart, inserted on dorsum of propodosoma about twice their lengths from anterior end. Interlamellar hairs absent. Dorsum of propodosoma with three large depressions on either side of raised platform posterior and lateral to lamellar hairs; three pairs of smaller depressions on dorsum between pseudostigmata, arranged in a linear fashion (fig. 7). Pseudostigmata wide cups in postero-lateral margins of propodosoma, with heavily sclerotized rims; pseudostigmatic organs clavo-lanceolate, pectinate, almost straight, extended laterally, with a long, narrow pedicel.

Hysterosoma oval in outline, about two-thirds as broad as long, bluntly pointed posteriorly, smooth and rounded dorsally, with seven pairs of long, curved simple setae; left side of specimen broken.

Camerostome rounded with two long ventral setae in posterior third. Apodemata I and II heavily sclerotized, curved; apodemata III straight bars; apodemata IV curved posteriorly, forming an arch anterior to genital covers; a pair of setal insertions near top of arch; ventral plate broken on right side (fig. 8). Genital opening rectangular, situated at level of leg IV, anterior border partially circumscribed by arch of apodemata IV. Genital covers rectangular, about twice as long as broad; each cover with four genital setae; g:1 and g:2 inserted in middle of anterior half of cover; g:3, g:4 inserted near postero-lateral corner of cover, g:4 closer to posterior margin than g:3 (fig. 8). A pair of setal insertions posterior to genital opening, separated the length of one genital cover. Anal aperture twice as large as genital aperture, rectangular; anal covers slightly broader posteriorly than anteriorly, each cover with two setae; a:1 near lateral margin of cover and a third the length of a single

cover from anterior end; a: 2 inserted in medio-posterior corner of each cover.

Ewing (1917) states that the "legs (are) prominent, but short for the genus; anterior pair extending beyond the tip of the rostrum by over one-half their length, tarsi longer than tibiae, tibiae each with a long tactile hair at its tip above, which extends beyond the tip of the tarsi. Coxae of third pair of legs sub-spherical in shape, each with a small tubercle on its anterior aspect and a single strongly curved, singly pectinate bristle. Posterior legs extending beyond the tip of the (hysterosoma) by the full length of their tarsi. Most of the segments of the legs are moderately swollen toward one end, and pedicellate at the other end."

Length 293 μ , hysterosoma 207 μ ; width 153 μ .

This species was collected in Illinois, but the locality and the collector are unknown. Dr. Ewing had a single specimen "of this very minute and rare species."

Discussion: It seems obvious from the comparisons of this species with drawings and descriptions of genera in Belbidae that the species described above does not belong in any of the bellid genera. Its size and other features of the body conform to the characters of the genus *Oppia*, for which Grandjean (1953) designated the family Opiidae. The configurations on the propodosoma are unlike those of any others the writer has seen in the literature and he therefore considers this to be a valid species in the genus *Oppia*.

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